QUARTERLY SUMMARY

OF THE

IMPROVEMENTS AND DISCOVERIES

IN THE

MEDICAL SCIENCES.

ANATOMY AND PHYSIOLOGY.

1. *Investigations on Low Organisms.*—In our preceding No. (p. 244) will be found an account of some interesting investigations by Prof. Rindfleisch, of Bonn, on this subject. The learned professor has continued his researches, and published the results in *Virchow's Archiv.* for March last. These experiments have even greater scientific interest than the previous ones. His present researches have reference to the origin of those lower organisms which appear in decomposing substances, and to which the author applies the name schizomyceta, including vibrios, bacteria, zoogloea, etc. In reference to these bodies, the great question is, Do they attach themselves to putrefiable (but not yet putrefying) substances, and, by their vital processes, induce the putrefaction of these substances? or, on the other hand, are they merely the results of putrefaction, the substances first decomposing, and so affording a fit medium for the development of their organisms, which arise by equivocal generation from the decomposing body? The author, it may be remarked once for all, used the greatest precaution in conducting his experiments, the metal instruments which he used were always, immediately before using them, heated to a red heat (superheated) and the glass slides, etc., first steeped in absolute alcohol, and the alcohol got rid of by burning it off in the flame of a lamp. The substance experimented on was a minute portion of the muscle of a freshly killed animal, removed with the precautions referred to, placed in distilled water on a glass slide, and examined with an immersion lens. He found very soon that a number of granules appeared, which possessed a rapid motion; that these after a time adhered to some part, the free end or head hanging loose in the fluid. This end increased in length and thickness, so as to form a club-shaped body, and by and by the head of the club became separated from the handle by a groove so as to form two joints of a chain. By repetition of this process a chain was formed of considerable length, and consisting of numerous joints. Each joint seemed to possess the power, so long as it retained its position, of dividing into a number of smaller members, and, contrariwise, neighbouring joints seemed to have the power of resolving into a single large one. The chain so formed then may break up, each joint forming an individual bacterium, which possesses a spontaneous power of motion, and is hence considered by the author to be animal in its nature. Sometimes these bacteria collect together into groups, and come to a state of rest, forming what Cohn has named zoogloea, but these are not to be looked on as the source of the bacteria. Coming to the naked eye appearances of decomposing substances, the thin scum which grows on such fluids is due to the interlacing

chains described above, these chains hanging down into the fluid and giving off the individual bacteria. In addition to bacteria, the author found in his experiments the organism named micrococcus, which he considers the lowest vegetable form, as the bacterium is the lowest animal. The micrococcus does not possess voluntary motion, and has no relation whatever to the bacterium. At this stage, and before considering how the questions started at the outset are to be answered, the apparatus used is described. A glass slide the size of stage of the microscope is taken, and a square piece of an ordinary glass slide attached to it with Canada balsam. Around this latter is placed a piece of blotting paper, which communicates with a vessel outside containing water, and finally the cap of Recklinghausen's moist chamber is placed over the slide. The piece of muscle is placed on the square glass slide and covered with a cover-glass fitted with wax as described in the former paper.

Now as to the origin of these lower organisms. He found that they appeared in the fluid after two days, when he had used distilled water and taken the greatest precautions against the admission of dust. He found, however, that, on using ordinary spring water instead of distilled water, the development was much more rapid and the organisms more abundant, and this set him to consider whether distilled water may not have picked up after its distillation the germs of these organisms, or whether the germs are actually destroyed by boiling, the experiments of Cohn rendering it probable that certain organisms do survive boiling heat. He, therefore, determined to repeat the experiment, taking greater precautions that the water was not contaminated. A glass slide, which had been most carefully prepared as above, was held over a vessel containing boiling water, and the condensed steam collected into a drop by a piece of platinum wire which had just been superheated. When this water was used for the experiment instead of ordinary distilled water, "even after weeks, no schizomyceta appeared." The germs of these organisms had therefore in the former experiments been picked up by the distilled water. That these germs had been derived from the contact of the distilled water with the earth, and not from the air, was proved very sufficiently by the following. Portions of meat from a newly-killed animal were placed (with the usual precautions) in open-mouthed glass bottles, and exposed outside the house to the sun and rain. The rain came down, doubtless carrying with it all the solid impurities of the atmosphere, and was succeeded by heat. But, though this decomposable substance was thus exposed to all the atmospheric conditions of putrefaction, and though fungi grew in it in considerable abundance (their spores floating in the air) yet no bacteria were developed and no odour of putrefaction. This took place while other preparations which had simultaneously been made with ordinary distilled water swarmed with bacteria. The conclusions from these facts are obvious; no putrefaction occurs without these organisms, and they are therefore the causes of putrefaction and not the results; their germs must be communicated to the decomposable substance before it putrefies, and these germs are derived from the earth and not from the air; these organisms cannot arise from fungi, for here were all the other conditions of putrefaction and fungi in abundance, but no decomposition occurred. The author, at the end of his most valuable paper, suggests the application of his method to the investigation of diseases supposed to be of parasitic origin, and concludes by summing up his results in nine propositions.—*Glasgow Medical Journal*, August, 1872.

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2. *Characters of the Uterine Movements.*—D. L. Oser and W. Schlesinger have undertaken a series of investigations on the characters of the uterine movements, which, they observe, have been but little studied of late years, and with improved means of research, whilst those of the intestines, ureters, and other organs have been carefully examined. Their experiments were performed upon for the most part twenty curarized animals, and are recorded in the last part of Stricker's *Med. Jahrbucher.* At the commencement they found not unfrequently that a stimulus which in one animal excited the most violent uterine contractions, in another was apparently wholly inoperative, and this not only in animals of different genera, but in those of the same species. In

rabbits, for instance, it sometimes happened that the slightest mechanical stimulus called forth active contractions, whilst in another animal no response occurred to the strongest electrical currents. They find that the animals best adapted to exhibit the movements are young but sexually mature rabbits which have not yet been impregnated. In these the uterus, when the abdominal cavity is laid open, appears as a flat, band-like, pink-coloured organ, at perfect rest, and but rarely exhibiting spontaneous movements. Their first experiments were made to determine the effect of arrest of the respiration. Krause, Mayer, and Basch have all shown that asphyxia induces movements of the intestines; but it has not hitherto been shown that a similar effect is produced upon the uterus. Oser and Schlesinger's experiments, however, show that, in from ten to thirty seconds after suspension of the respiration, contractions are perceptible, commencing from the tubæ and cervix, which in a few seconds more extend over the whole uterus. This organ becomes pale, cylindrical, and rigid, and moves downwards and towards the middle line; the cornua raise themselves in an arched manner, and, intercoiling, almost form a ball. The contractions increase in vigour with continued arrest of the respiration for some minutes. In a second set of experiments the effects of compression of the aorta were investigated, and it was ascertained that general contractions of the uterus occurred in a period varying from eighty to one hundred and twenty seconds after. Rapid abstraction of blood from the system generally produced the same effect. It was remarkable also that contraction of the whole uterus resulted in a few seconds from suddenly applied compression of the four cerebral arteries, which showed that the presence of imperfectly arterialized blood in the uterus itself was not a necessary condition for the production of the contractions. Kussmaul and Tenner long ago described a somewhat similar experiment, but gave a different explanation of the phenomena observed. In a pregnant rabbit they exposed and compressed the carotids and vertebrals. Extrusion of the fœtuses occurred, but it was accompanied by convulsions, and they attributed the delivery to these rather than to any contractions of the uterus. MM. Oser and Schlesinger further found that, after section of the spinal cord in the cervical region, the contractions of the uterus no longer occurred more rapidly after arrest of the respiration than after compression of the aorta, in each case supervening in about the same space of time—that is to say, in about one hundred seconds. After section of the cord, neither general loss of blood nor arrest of the flow of arterial blood to the brain produced any perceptible contractions. It was ascertained that no motor stimulus is conducted to the uterus from the brain through the vagus or sympathetic nerves, since section of these nerves was without influence on the movements, whether the cord was divided or not. The authors of the paper do not attempt to fix the situation of the centre for the uterine movements, but they point out that their experiments prove that it lies at a higher point than that at which they divided the spinal cord—namely, between the occiput and atlas; and they think it is probable that it occupies some part of the medulla oblongata. At all events, it is unlikely that it is situated in the spinal cord, since the experiments of Kussmaul and Tenner and Schiffer show very clearly that the circulation of dyspnœic blood (a term that implies no theory as to whether the phenomena produced are due to the absence of oxygen or the presence of carbonic acid) through the cord is not followed by any symptoms of irritation—as by convulsions—but by rapid paralysis of the posterior extremities, the paralysis appearing in the course of a minute or a minute and a half. But in Oser and Schlesinger's experiments the uterine contractions did not occur in any case till after the lapse of a minute; and hence, if it were maintained that they were due to the passage of dyspnœic blood through the cord, it must also be admitted that such blood acts coincidently as a stimulus to one spinal motor centre and as a paralyzer to another. It is much more probable that they are due to the passage of such dyspnœic blood through the medulla oblongata. Other considerations lead them to the same conclusion.—*Lancet*, July 20, 1872.